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No. 2.

THE

HARBOUR AND DOCK WORKS,

QUEBEC.

PUBLISHED BY AUTHORITY OF THE COMMISSIONERS.

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PREFACE.

To the Hon. Hector L. Langevin, C. B.,

&c., &c., &c.,

Minister of Public Works.

The principal part of the summary of the progress made during the season of 1879, with the Quebec Harbour and Dock Works, with the accompanying plan, formed the subject matter of a leading article in the Quebec *Morning Chronicle* of November 27th, 1879, which it has been thought advisable to reprint, with a memorandum shewing the value of the land reclaimed by the Harbour Works in the now named "Princess Louise Embankment," which can be leased or sold on the completion of the works.

To this has been added a second memorandum on the value of the through line of Railway along the centre of the above-named embankment, with an accompanying drawing of the Ferry-slip and Train Ferry-boat, and line of Railway as proposed on the South Side of the St. Lawrence, from a point near Glen Burnie's Cove to St. Michel, on the Intercolonial Railway.

Quebec, December, 1879.

THE HARBOUR AND DOCK WORKS,

QUEBEC.

Published by authority of the Commissioners.

We have again with feelings of hearty satisfaction to lay before our readers, far and near, interested with us in the progress and welfare of the Dominion of Canada, a summary of the progress made during the season now about to close, with the Harbour and Dock Works, in which so lively an interest is naturally taken by all concerned, of whatever section of party or shade of political opinion. Even in this day of great engineering enterprises these works may fairly take rank amoung the most important now in progress. In size, construction, and position, these grand additions to our magnificent river's harbour accommodation, will be, in reproductive result and self redemption of first cost, by the reclaimed land within their walls, alike unique and without parallel. From end to end this great Basin, measures 4,000 feet. It is 900 feet wide, and will inclose a water area of 60 acres, 40 acres of which are to be Wet Dock and 20 acres of Tidal Basin, with a minimum depth of 27 feet and 42 feet respectively below high water, while the level of the quays will be six feet above that line. The work has now advanced so far that the entire area is fairly enclosed. But there is a mass of material yet to be dug out, and the large dipper dredge and its companion the clam shell are steadily at work scooping up the sand, the ballast and the boulders and de-

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positing them in the huge buckets of the Hercules derrick, to be landed at a turn 220 feet distant inside the embankment. A useful invention is ever self developing. The revolving derrick formerly moved on from block to block on wheel ways. It has been found more handy to float it, so that at a tide's notice it can be moved from one end of the work to the other. Yet it stands a colossus, the centre pier of a swing bridge with its revolving half arch on each side, bearing a net load of three tons a minute when in full blast. A heap of old jims, of notions and dodges clustered together to make up a new implement destined always in like conditions to be the active co-efficient of the clam shell and the dipper dredge.

Approached from their northern side from the direction of Beauport or Montmorency Falls, the new docks are seen as the outworks of a fortification, with its salient angles and its long breastwork of close timber caisson walling of 4,500 feet in length, forming by its perfect line and workmanship, a finished river frontage to the north side of Quebec. Along this we next season hope to see the first engine and waggons of the North Shore Railway working toward and along the former 900 feet of outside wharf frontage now joined up, facing the St. Lawrence. Should this be so, in a period of depression, we shall indeed have moved forward, and have made provision for success, while progress halted.

Turning now to our narrative of work done during 1879 —the working season opened fully a month later than 1878—the contractors' plant was moved in on May the 6th, and work fairly commenced about the 15th of that month.

The winter ice had practically no effect on the cribwork and concrete foundation of the Quay Wall of the Tidal Basin, no sensible settlement or movement being apparent in the whole line of points fixed as bench marks for test-

ing the work at the end of the previous season—the Portland cement concrete having set with its well known hydraulic properties, like stone under the water, holding the projecting cogging stones in position against all the friction of the heavy ice. The outside low cribwork suffered some damage, the indraught current setting in the direction of the harbour entrance at Point à Carey having given force to abrasion and pressure of the batture, so as to crush it completely at one point. These repairs have been made good, and the whole length of the outer face has since been carried to coping level and will be banked in, so that the ice can have no action upon it, beyond that which similar structures are known to resist. The Commissioners had determined at an early stage of progress with these works, to adopt the alternative method of construction provided for by the contract, viz., of employing stone for the construction of the Quay Walls from four feet above low water, in lieu of a timber facing, and the first section of 1,240 feet has been brought up higher than the tidal range, for almost the entire length, and up to coping level, for a section of 150 feet. The coming winter will test its power of resistance, of which, no doubt is entertained. This season has witnessed the commencement of the piling and sinking the rear cribwork of the foundation of the Wet Dock section of these works. Far less difficulty than attended the sinking of the deep cribs of the Tidal Basin has been experienced. Scarcely a hitch of any kind has occurred, and the whole work bids fair to be a complete success. The piles have been driven in true line, any deviation which had taken place, in removing temporary wales, and fixing the caissons, in rear, having been at once taken up by back strutting until the concrete was filled in. Subject only to such modification as facilitated the progress of the work, this section of the improvements now in progress, is being carried through strictly in conformity with the original design, the principle object being to construct a Wet Dock in

the upper reach or section of the works, which shall provide float water of uniform depth of 27 feet at all times of the tide, alongside the quays and wharves inside, so that vessels and steamers may discharge, subject to no inconvenience from rise or fall of water or strong currents,—with a tidal basin on the outside

The works have already so far advanced, as to demonstrate the advantage of these harbour conveniences to the port of Quebec, it being even now safe for a valuable ship to winter under the protection of the embankment, completely cutting off all ice shove, such as the "Aurora" had to contend with some years ago; so that with the completion of the Graving Dock, Quebec will have advanced towards being one of the most commodious naval stations in the Dominion.

It is well to bear in mind that these works are being constructed in a tideway, having a rise and fall of 18 feet at springs, with no protection by cofferdams for fixed profiles for carrying the lime and batter; each fresh starting point for pile driving and for masonry, having to be fixed by transit, yet the whole work has so far been carried on with only a very minimum of error—one of these in a small portion of the masonry--being partly due to the movement and vibration of the transit station point by the filling in of the ballast wharf. The contractors have been allowed to correct this by small offsets where the angular deffection occurred, to be dressed down and taken to a true batter, in place of removing the masonry which, owing to its being laid in Portland cement, could not have been done without breaking and damaging much of the stone. Piling for the foundation of the wet dock wall has, for a distance of 1,500 feet, been most successfully and skilfully driven, in nearly a perfect line, against which the small cribwork caissons have been brought home by screw bolts through guage piles, strutting wales and sheet piles for the entire

distance; with the elm capping in position, all brooming of the piles, by pressure of ice, will, it is expected, be entirely prevented.

The Graving Dock has not made such progress as was anticipated, the difficulty of transporting plant early in the season from the contractors' works at St. Catharine's, on the Welland Canal, contributing to the delay, and the exceptional character of the entrance work also required floating plant and special machinery, for which provision had to be made. The cill of the Graving Dock and the work beneath it, being situated below the level of the foundation of the old Government wharf, the side of that structure had to be cased in with sheet piling. This has been effected, subject only to the ordinary difficulty and risk, that might be expected to arise from the settlement of the wharf, from the footings having to be removed to drive the piles to the depth of protection required as an auxiliary portion of the coffer-dam. The excavation of 16,000 yards in the dock pit, and the piling and concreting of 2,300 yards in the wing wall foundations, with such of the filling in as has been tipped in place, gives the total quantity of work so far done. The Government Engineers at Ottawa and the Engineer of the Montreal Harbour Commission, having inspected and approved the plans and method of construction adopted, which have proved so successful elsewhere, reflecting so much credit on Messrs. Knipple & Morris, the designing Engineers of Westminster and Greenock; that nothing will be wanting under the present able local supervision and management, to bring these most important works to a successful completion.

By the construction of these works, the outlines of which have been already indicated, and are more fully illustrated in the lithographic plan accompanying this summary, the most effective terminus for the shipment of the general traffic of the Canada Pacific Railway and the systems already in operation, in the direction of Manitoba, is clearly

indicated. We say this, by no means expecting or desiring to upset vested interests now connected with our canal and lake system of water carriage, in conjunction with the Grand Trunk Railway already in operation. But the present generally increasing and developing trade to the northward and westward of such points as Selkirk and Fort William must naturally, with complete railway extension, find its way to and through Quebec, as a port of shipment. No system of land carriage can compete with water carriage on equal terms, as a question of rate per ton per mile, but when time enters largely into the calculation, as a factor and a line of direct railway intercepts the traffic inside the outer or coast line, land carriage by rail, has always superseded water carriage.

It has been stated that the Red River Valley alone, could furnish all the breadstuffs which Great Britain at present requires to import—nearly one-third of it lying within the Canadian Dominion. This latter district being equal, on this basis of calculation, to the production of 30,000,000 bushels, or 4,000,000 quarters of wheat. Should one-half of such an estimate be the resulting traffic in this department of industry, in combination with the area of production provided for by the St. John's Lake Railway, now under construction, we may fairly look forward to the time, when the neighborhood of the Palais, and the "Princess Louise" Embankment, with its fine building sites, will be a busy hive of industry, the nucleus of a new settlement, where a little army will find employment as soon as ships find their way within the accommodation afforded them by the new works. We mention the above instance only, as one among the many encouraging forecasts of a prosperous future now appearing to the view to stimulate our flagging spirit of enterprise, and to strengthen, if possible, the hands of the Executive, which now with well directed earnestness of purpose is resolved on the continued and energetic prosecution of these productive works.

ANNEXURE WITH GENERAL PLAN

Memorandum showing the probable available area for sale or lease on the Main Embankment, after deducting the widths of three lines of street and cross-street, quays and railways, as shown in the accompanying general plan. viz. :—

—	Block.	Area in feet.	No of Lots.
		Sup. feet.	
Front or South Quay Lots.	A.	60,000	12 lots.
	B	60,000	12 "
	C.	60,000	12 "
	D.	25,000	5 "
	E.	55,000	11 "
	F.	47,180	11 "
Back or North Quay Lots.	G.	60,000	12 "
	H.	60,000	12 "
	I.	60,000	12 "
	J.	11,880	3 "
	K.	58,000	11 "
	L.	22,000	6 "
Undivided Spaces.	M.	46,000	1 space.
	N.	26,400	1 "
	O.	3,000	1 "
	P.	3,200	1 "
Total.....	.....	657,660	119 lots and 4 spaces.

The value of these lots, if sold at the price paid for land in the Palais by the Quebec, Montreal, Ottawa & Occidental Railway, viz: $1 per foot superficial, would amount to $657,660. At the rentage of Corporation wharfage land in the Palais, of $12 for 144 superficial feet, for 4,567 such areas, the number contained in the total area per shedule, there would accrue an annual rental of $54,-

804, equivalent to six per cent, on the probable total cost of the works at present under contract, including all contingencies and extras, if assumed at $750,000, allowing a margin for loss and cost of collection.

To this should be added the probable Harbour Dock and Wharfage dues. These might reasonably be assumed to yield another $20,000, which added to the land rental, would amount to a total of $74,804, thus yielding a fairly estimated revenue, equivalent to the interest of six per cent., on a capital of $1,250,000.

MEMORANDUM No. 2.

The two drawings annexed shew probably the best route for a Railway Ferry for connecting the Harbour Improvements in progress in the River St. Charles, from the end of the Main Embankment to the South Side of the River St. Lawrence in such a way as to complete through Railway communication at all seasons of the year, with the Intercolonial Railway, at some point in the neighborhood of St. Michel.

The plan proposed is much the same as that taken in similar cases, but particularly in a strictly analogous one used for crossing the River Kennebec, in the State of Maine, U. S.

This Ferry crosses from Bath (Maine,) to Woolwich (Maine,) a distance of three-quarters of a mile, the river being entirely closed during the winter season, excepting the passage made through the ice by the Railway Ferry.

The boat is about 200 feet long, and takes over from four to six railway cars, passengers and baggage as a through Train, without, of course, the locomotive.

Ice forms in the Kennebec from six to eight inches in a single night at times, and within two miles of the Ferry ice from eighteen inches to two feet thick is cut and harvested for shipping. More ice is said to be cut for commercial purposes on this river (Kennebec,) for the South, than in all the Northern Rivers put together.

Five minutes detention is the average the whole year round, in working the Train Ferry, between arrival and departure.

As has been said, this crossing is nearly in every sense analogous to crossing the St. Lawrence by the same means from the end of the main Embankment—see drawing, No. 1 annexed, being an enlarged view of the end of the Harbour works.

By joining up from a similar Ferry dock, in the neighborhood of Glen Burnie's Cove, (see drawing No. 2, general plan of scheme,) and passing the back of Marquis' ship yard, the Graving Dock, the property of Mr. James Patton and Messrs. Gilmour; thence following the line of scarping along the hills, to the first available secondary valley forward to a junction with the Intercolonial Railway as shewn through communication would be complete. A junction could also be formed with the Levis & Kennebec Railway, if so desired, from or near this vicinity.

By this means, direct and unbroken Railway Communication would be at once established throughout the year, (winter and summer,) with Halifax on the one hand, and New York on the other.

In order to accomplish this by the most convenient means—the main line of Railway communicating with the North Shore, otherwise called the Montreal, Ottawa & Occidental Railway—should be taken down the centre of the "Princess Louise" Embankment, a line at once most easily

utilizable for railway purposes, to a point in the cribwork at almost the centre of the line on the first angle of deflection from the corner of the Ballast Wharf, (see drawing No. 1,) at which point a ferry dock should be constructed as shewn, with a balance slipway from which to run the trains on to the Railway Ferry Boat.

The slope of this Ferry inlet is designed so as to enable the boat to shove off any ice drift, by moving along the cushion formed from the corner along the run in.

The current of the St. Lawrence always keeps this corner clear, it being the end of a tangent to the curve formed by the batture on the Beauport shore, and all that would be required would be the push of the boat on arrival, forcing any drift-ice round the head of the small slip-pier.

As the plans shewn are not detailed, estimates are not given, but there is no doubt these works could be constructed at a reasonable cost with a certainty of success.

WOODFORD PILKINGTON, M. Inst. C. E.,
Resident Engineer.

Quebec, December 10th, 1879.

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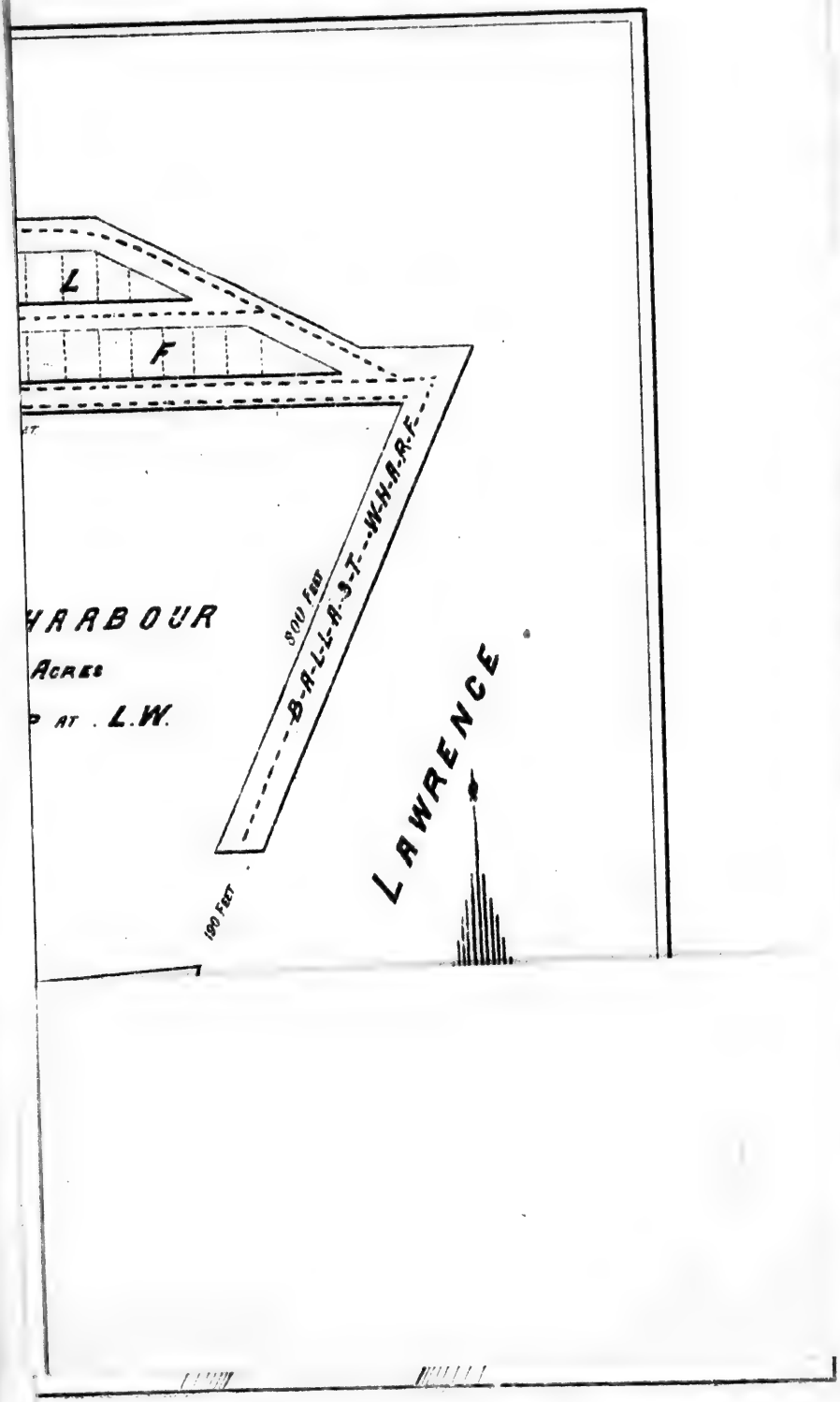

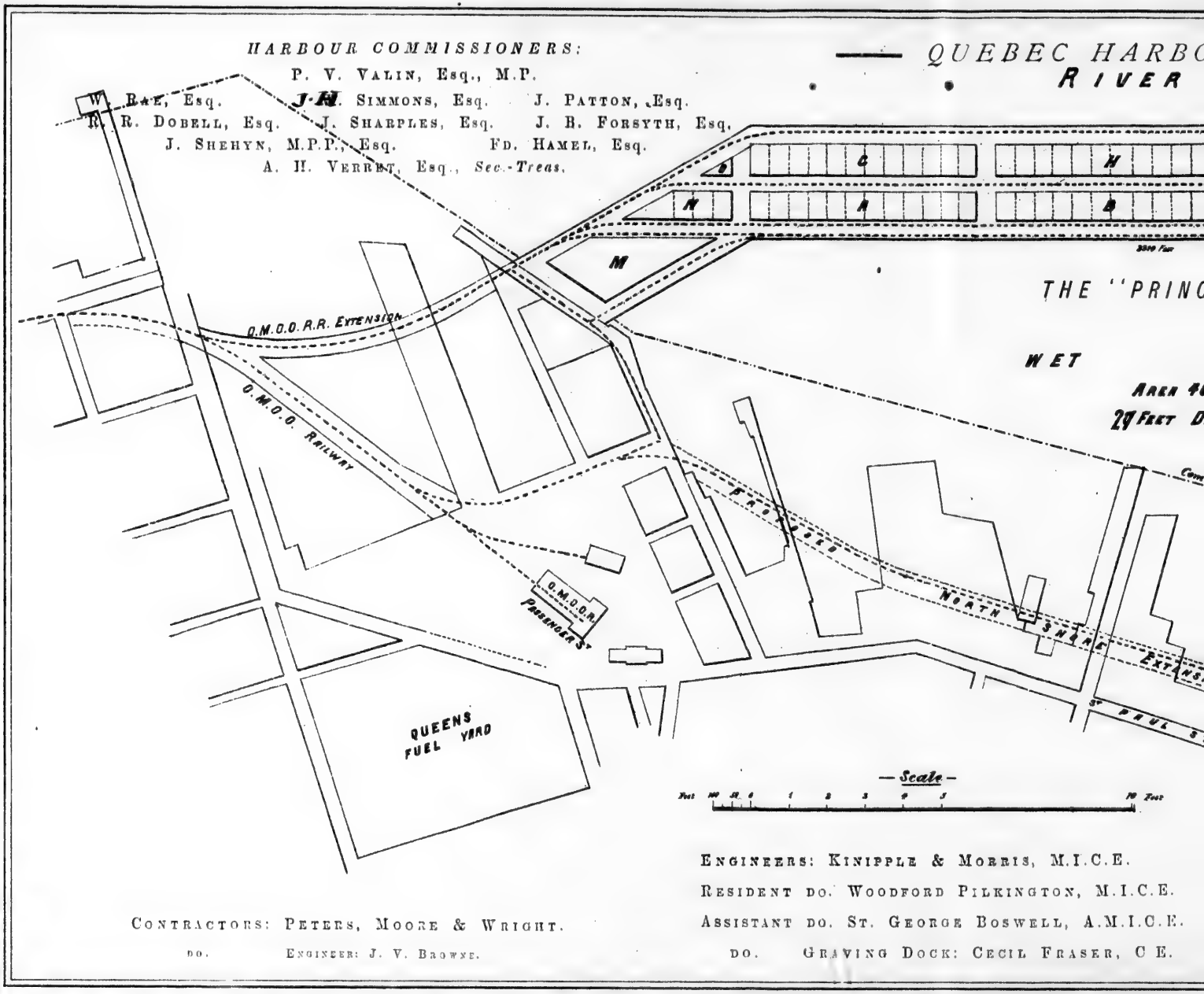
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QUEBEC HARBO
RIVER
THE "PRINC
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AREA 4
29 FEET D
O.M.O.O. R.R. EXTENSION
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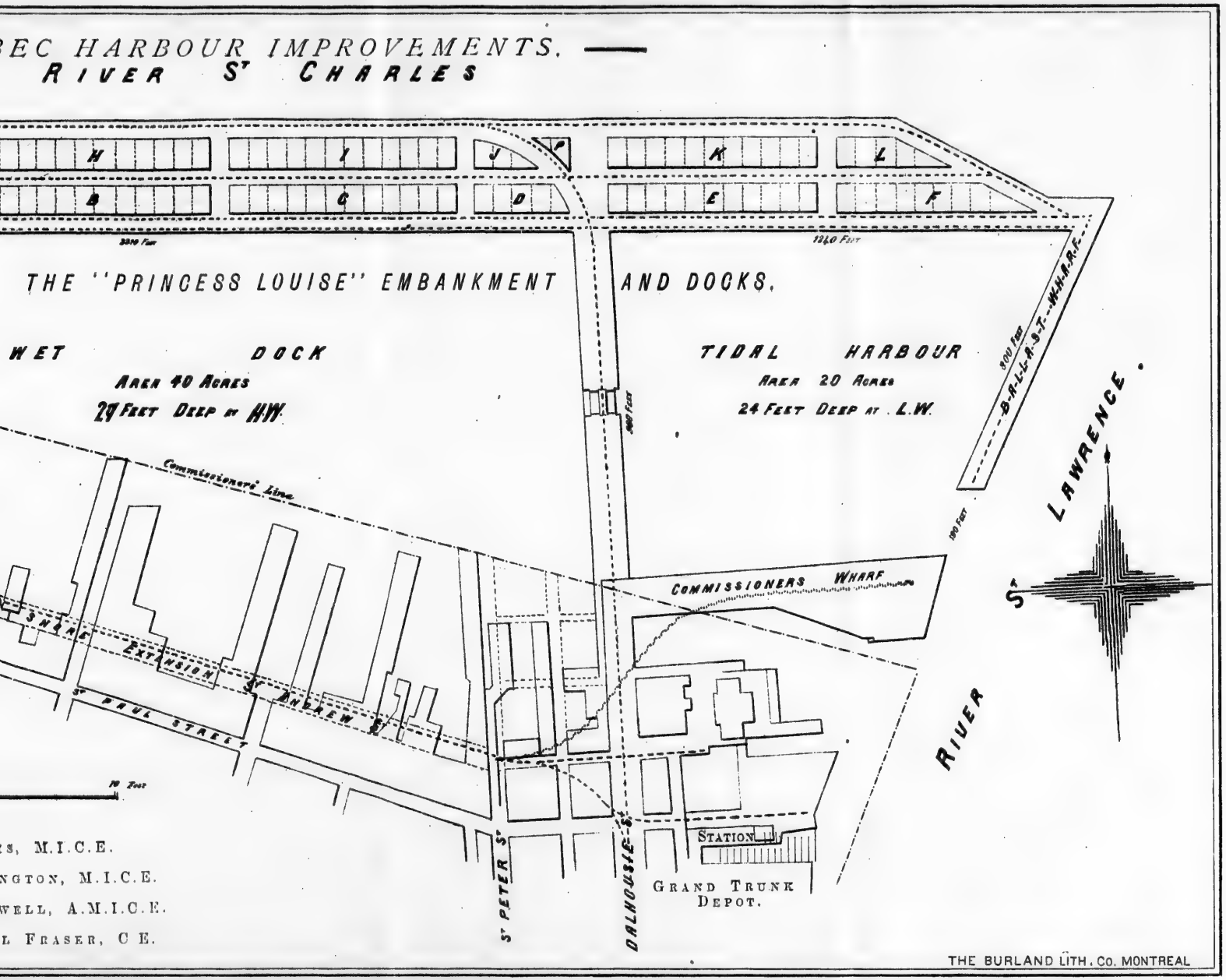
QUEENS FUEL YARD
— Scale —
Feet 100 50 0 1 2 3 4 5 10 Feet
ENGINEERS: KINIPPLE & MORRIS, M.I.C.E.
RESIDENT DO. WOODFORD PILKINGTON, M.I.C.E.
ASSISTANT DO. ST. GEORGE BOSWELL, A.M.I.C.E.
DO. GRAVING DOCK: CECIL FRASER, C E.
CONTRACTORS: PETERS, MOORE & WRIGHT.
DO. ENGINEER: J. V. BROWNE.



BEC HARBOUR IMPROVEMENTS.
RIVER St CHARLES
H
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3310 Feet
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THE "PRINCESS LOUISE" EMBANKMENT AND DOCKS.
WET DOCK
AREA 40 ACRES
29 FEET DEEP AT H.W.
TIDAL HARBOUR
AREA 20 ACRES
24 FEET DEEP AT L.W.
300 Feet
B-A-L-L-A-S-T-W-H-A-R-F
Commissioners' Line
COMMISSIONERS WHARF
SHORE EXTENSION
St ANDREW St
St PAUL STREET
St PETER St
DALHOUSIE St
STATION
GRAND TRUNK DEPOT.
RIVER St LAWRENCE.
10 Feet
S, M.I.C.E.
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L FRASER, C E.
THE BURLAND LITH. Co. MONTREAL

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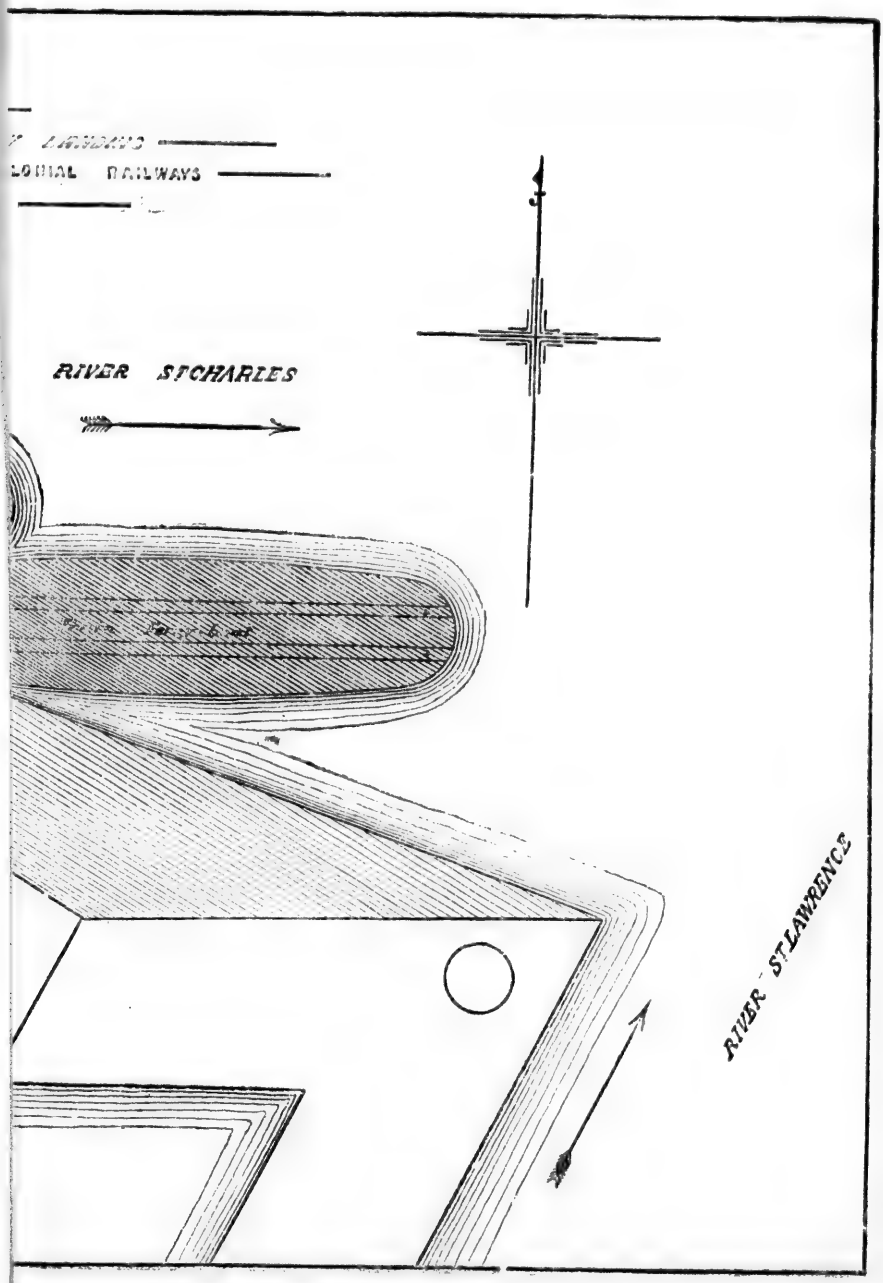

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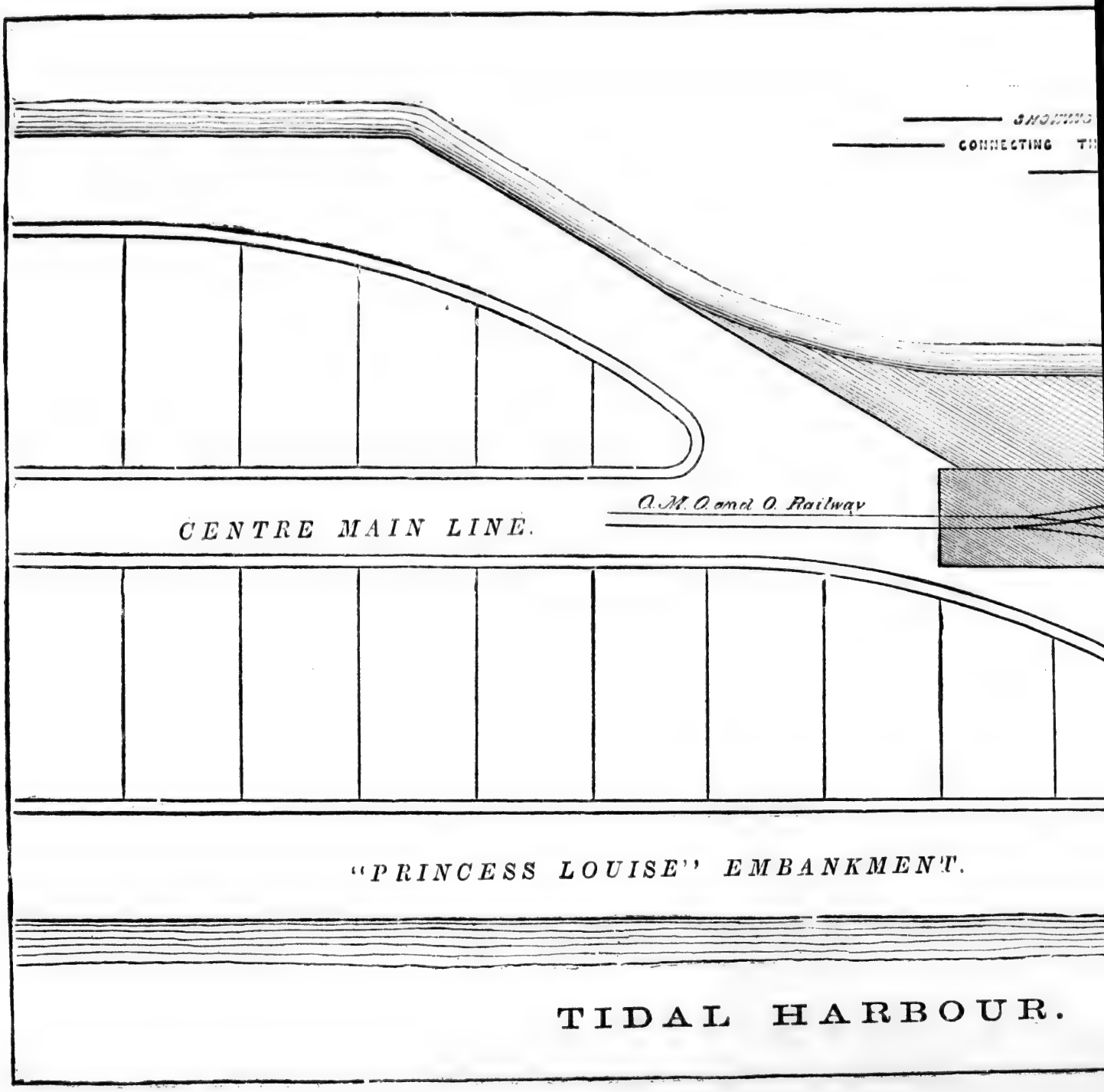
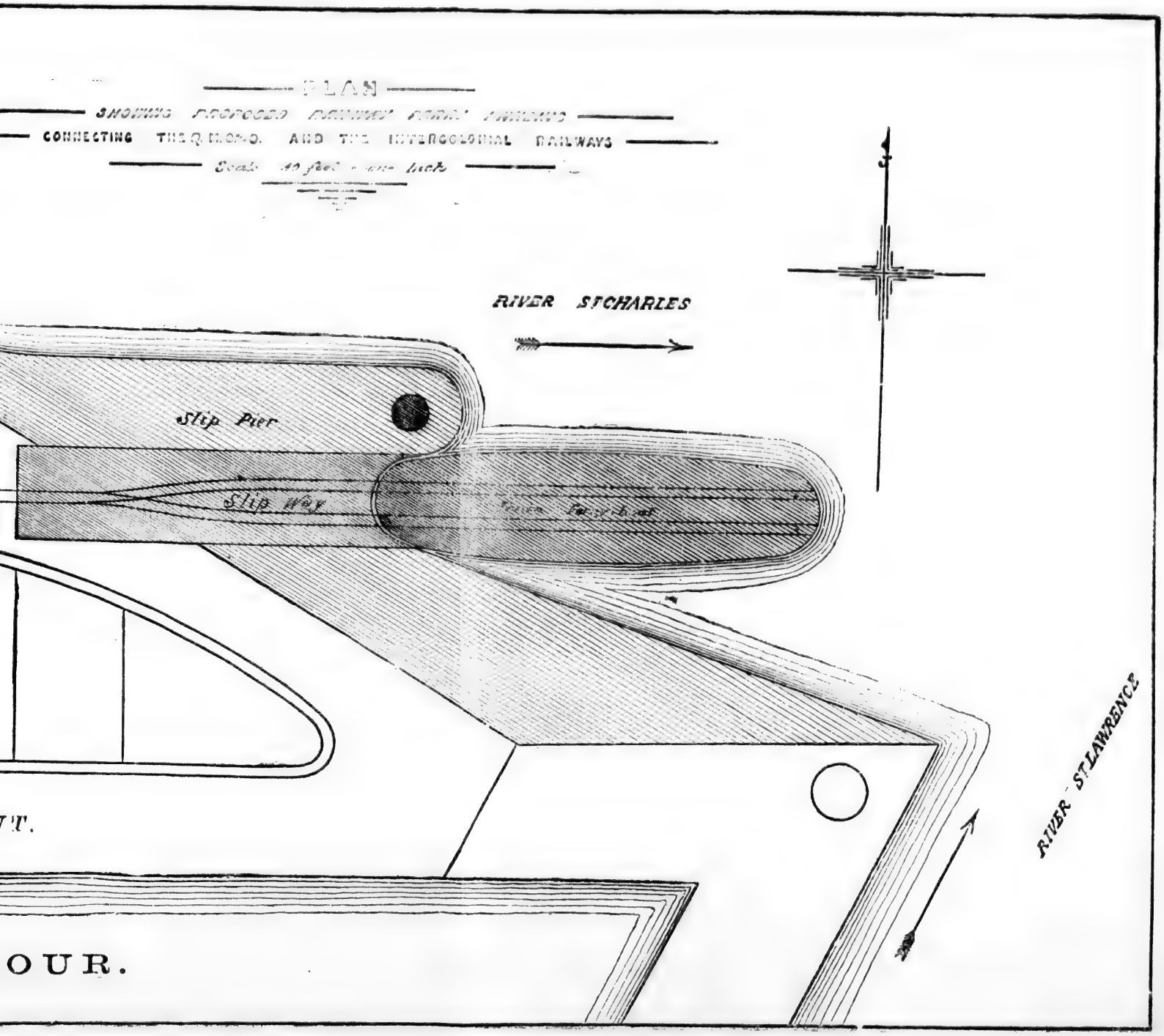


MEMORANDUM No. 2.

ED RAILWAY FERRY.

DRAWING No. 1.



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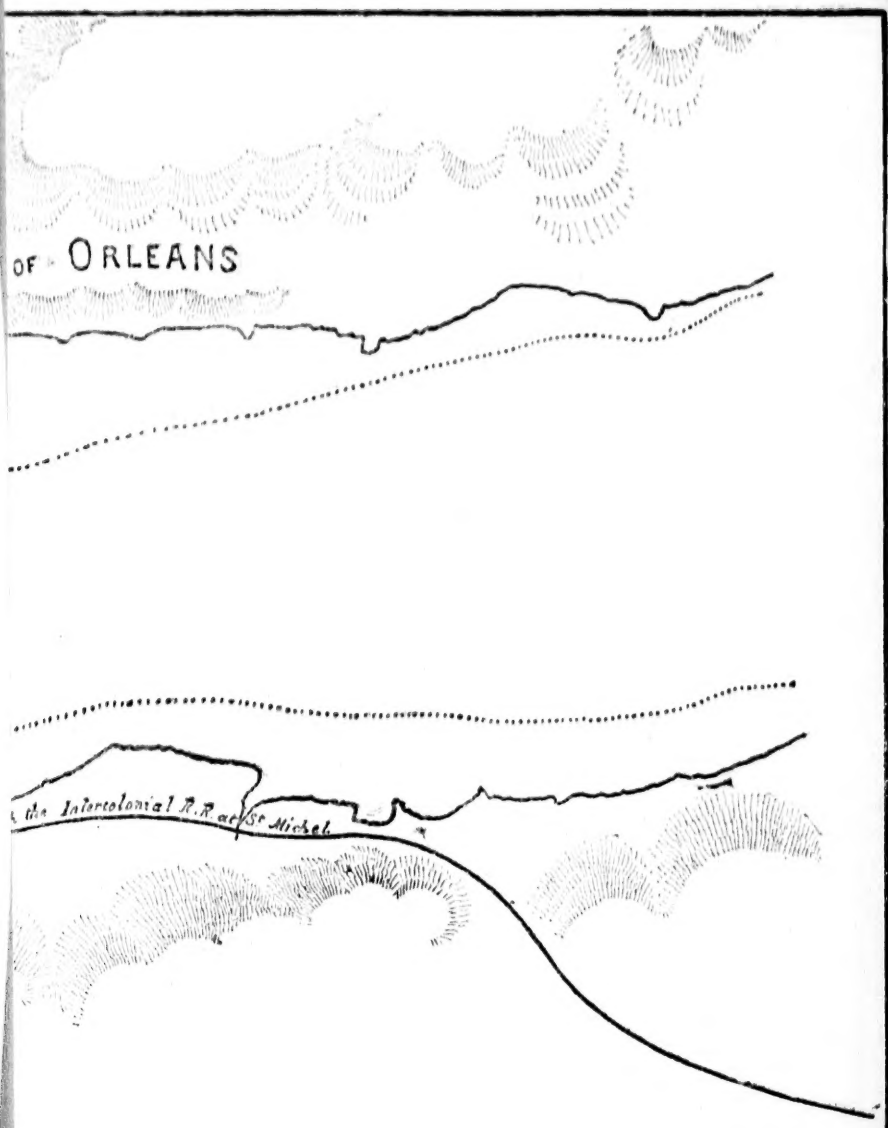


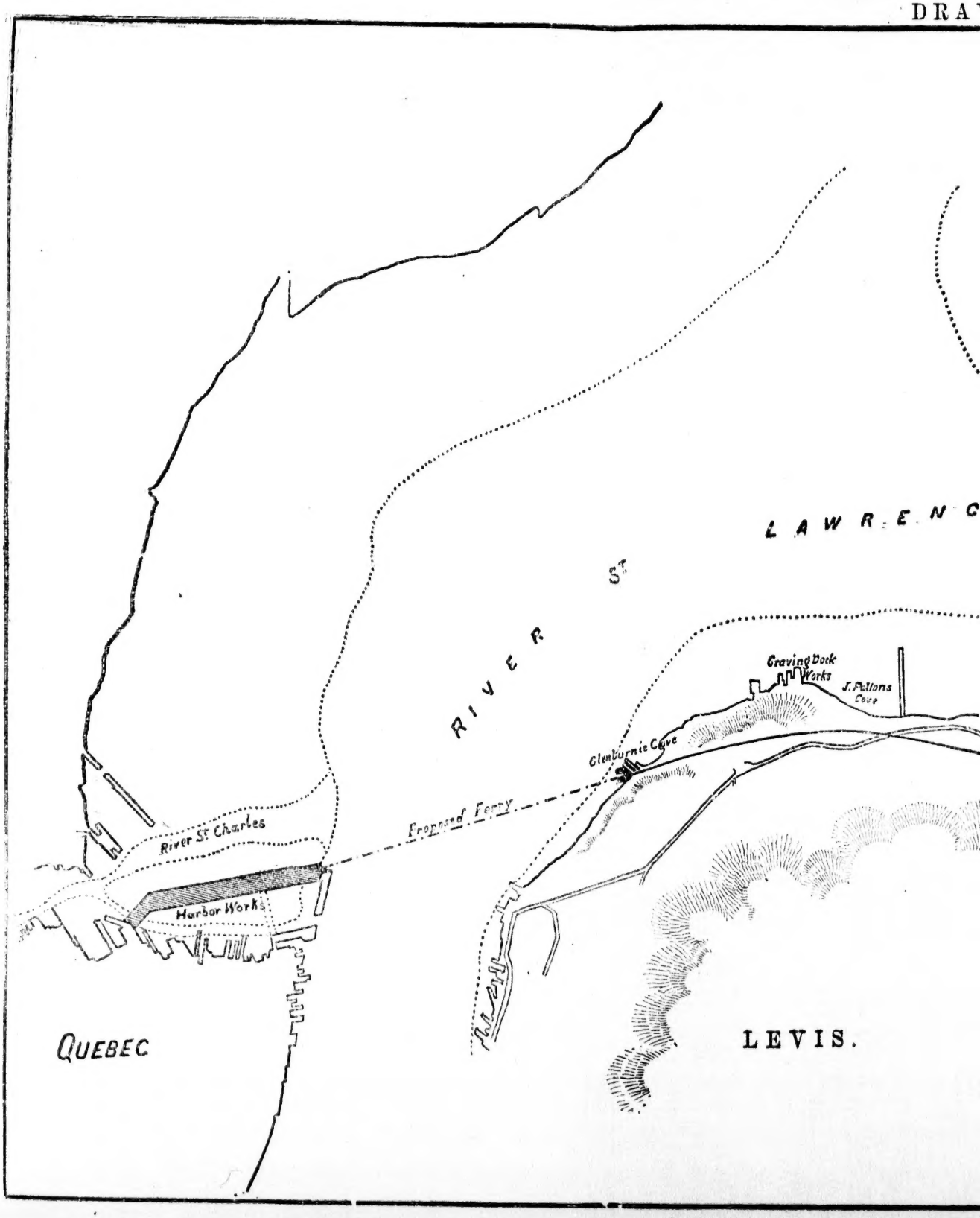
ST. CHARLES
OR
ST. MICHEL.

ENERAL PLAN——

SED RAILWAY FERRY LANDING ——
D. AND THE INTERCOLONIAL RAILWAYS ——

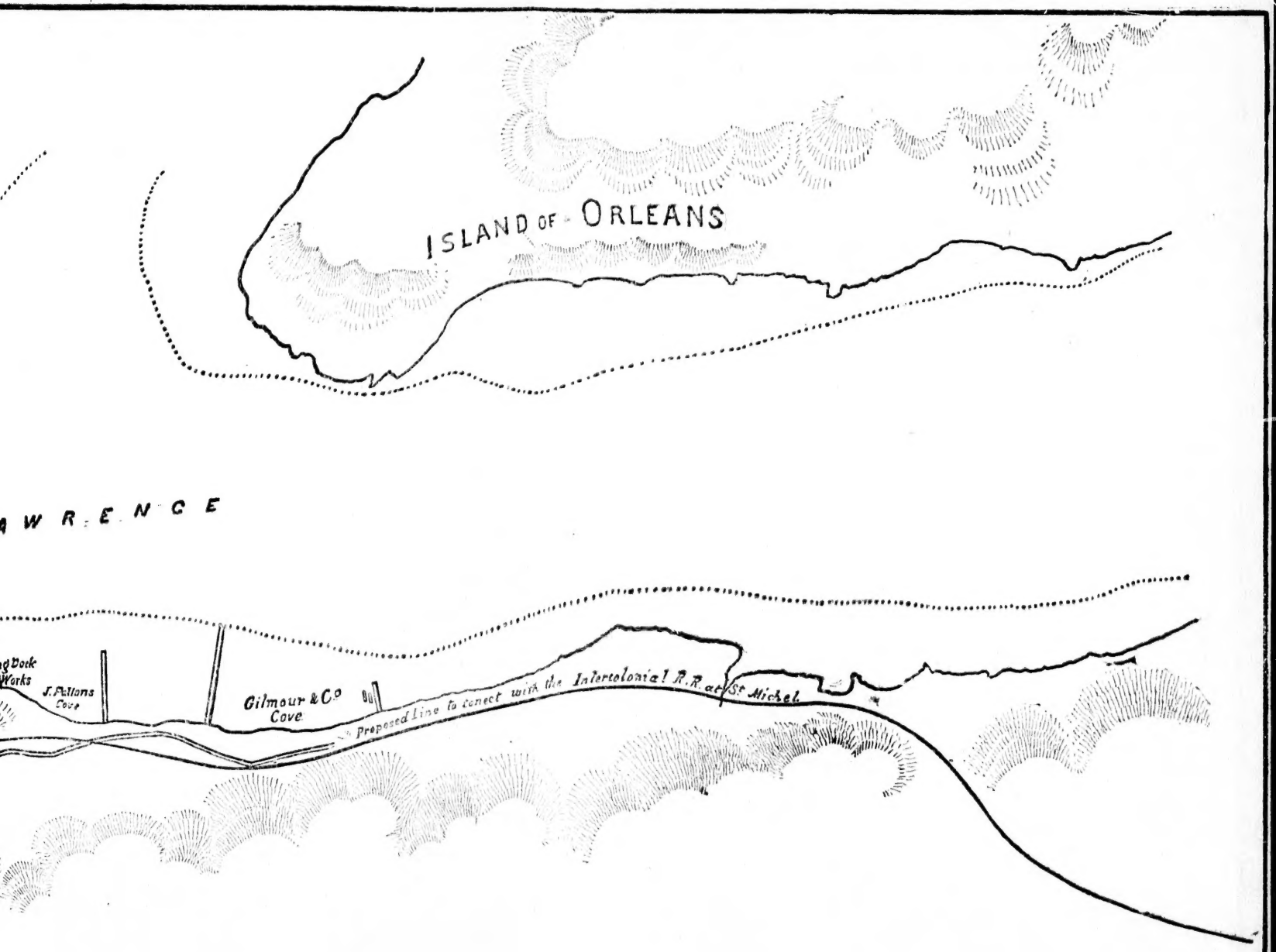
PROPOSED I

DRA



OSED RAILWAY FERRY.

DRAWING No. 2.



ST. CHARLES
OR
ST. MICHEL.

TIS.

— GENERAL PLAN —

— SHOWING PROPOSED RAILWAY FERRY LANDING —

— CONNECTING THE G.T.R. AND THE INTERCOLONIAL RAILWAYS —